

TITANIUM AND TITANIUM DIOXIDE¹

(Data in metric tons unless otherwise noted)

Domestic Production and Use: Titanium sponge metal was produced by two operations in Nevada and Utah. Production data were withheld to avoid disclosing company proprietary data. The facility in Salt Lake City, UT, with an estimated capacity of 500 tons per year, used the Armstrong method to produce high-purity titanium for use in electronics. The operations in Nevada, with an estimated capacity of 12,600 tons per year, used the Kroll method, the dominant process of titanium sponge production for use in aerospace, industrial, and all other applications. A third facility, in Rowley, UT, which produced titanium sponge using the Kroll method, was idled and placed on care-and-maintenance status in 2016 owing to low titanium sponge prices.

In 2017, an estimated 80% of titanium metal was used in aerospace applications; the remaining 20% was used in armor, chemical processing, marine hardware, medical implants, power generation, and consumer and other applications. Assuming an average purchase price of \$8.60 per kilogram, the value of sponge metal consumed was about \$318 million.

In 2017, titanium dioxide (TiO₂) pigment production, by four companies operating five facilities in four States, was valued at about \$3.0 billion. The estimated end-use distribution of TiO₂ pigment consumption was paints (including lacquers and varnishes), 68%; plastics, 25%; paper, 3%; and other, 4%. Other uses of TiO₂ included catalysts, ceramics, coated fabrics and textiles, floor coverings, printing ink, and roofing granules.

Salient Statistics—United States:	2013	2014	2015	2016	2017^e
Titanium sponge metal:					
Production	W	W	W	W	W
Imports for consumption	19,900	17,700	20,700	16,200	23,000
Exports	1,860	2,590	1,700	724	3,500
Consumption, reported	26,500	26,400	31,200	34,100	37,000
Price, dollars per kilogram, yearend	11.00	10.00	9.40	9.50	8.60
Stocks, industry, yearend ^e	25,200	22,900	25,000	25,100	20,000
Employment, number ^e	300	300	300	150	150
Net import reliance ² as a percentage of reported consumption	68	57	61	45	53
Titanium dioxide pigment:					
Production	1,280,000	1,260,000	1,220,000	1,240,000	1,260,000
Imports for consumption	213,000	224,000	221,000	247,000	182,000
Exports	671,000	685,000	649,000	651,000	622,000
Consumption, apparent ³	826,000	802,000	792,000	840,000	820,000
Producer price index (1982=100), yearend ⁴	236	224	176	175	170
Employment, number ^e	3,400	3,400	3,110	3,110	3,110
Net import reliance ² as a percentage of apparent consumption	E	E	E	E	E

Recycling: About 69,600 tons of titanium scrap metal was consumed in 2017—58,000 tons by the titanium industry, 9,800 tons by the steel industry, 530 tons by the superalloy industry, and 1,300 tons by other industries.

Import Sources (2013–16): Sponge metal: Japan, 78%; China, 8%; Kazakhstan, 6%; Ukraine, 6%; and other, 2%. Titanium dioxide pigment: Canada, 31%; China, 24%; Germany, 10%; and other, 35%.

Tariff:	Item	Number	Normal Trade Relations
			12–31–17
	Titanium oxides (unfinished TiO ₂ pigments)	2823.00.0000	5.5% ad val.
	TiO ₂ pigments, 80% or more TiO ₂	3206.11.0000	6.0% ad val.
	TiO ₂ pigments, other	3206.19.0000	6.0% ad val.
	Ferrotitanium and ferrosilicon titanium	7202.91.0000	3.7% ad val.
	Unwrought titanium metal	8108.20.0010	15.0% ad val.
	Titanium waste and scrap metal	8108.30.0000	Free.
	Other titanium metal articles	8108.90.3000	5.5% ad val.
	Wrought titanium metal	8108.90.6000	15.0% ad val.

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Depletion Allowance: Not applicable.

Government Stockpile: None.

Events, Trends, and Issues: Domestic consumption of titanium sponge in 2017 was estimated to have increased by about 9% from that of 2016 owing to increased demand by the aerospace industry. Additive manufacturing (3D printing) for aerospace applications continued to progress as the two major global aerospace manufacturers took deliveries of titanium structural components made using 3D-printing techniques.

Domestic production of TiO₂ pigment in 2017 was estimated to be about 1.26 million tons, a slight increase from that of 2016. In February, one of the existing domestic producers announced a merger to acquire the mineral sands and pigment operations of another company, which included TiO₂ pigment production operations in Ashtabula, OH. The acquisition, expected to be completed by the end of the first quarter of 2018, would result in a combined company with a capacity of 858 million tons per year and would be the largest global producer of TiO₂ pigments. In Pori, Finland, a 130,000-ton-per-year pigment plant experienced fire damage and at yearend 2017 was not operational.

World Sponge Metal Production and Sponge and Pigment Capacity:

	Sponge production		Capacity 2017 ⁵	
	2016	2017 ^e	Sponge	Pigment
United States	W	W	13,100	1,360,000
Australia	—	—	—	260,000
Belgium	—	—	—	87,000
Canada	—	—	—	102,000
China ^e	60,000	60,000	110,000	2,940,000
France	—	—	—	32,000
Germany	—	—	—	456,000
India	500	500	500	108,000
Italy	—	—	—	80,000
Japan ^e	54,000	48,000	68,800	314,000
Kazakhstan ^e	9,000	9,000	26,000	1,000
Mexico	—	—	—	300,000
Russia ^e	38,000	40,000	46,500	20,000
Ukraine ^e	8,000	8,000	12,000	120,000
United Kingdom	—	—	—	315,000
Other countries	—	—	—	806,000
World total (rounded)	^b 170,000	^b 170,000	277,000	7,300,000

World Resources: Resources and reserves of titanium minerals are discussed in the “Titanium Mineral Concentrates” chapter of this publication.

Substitutes: Few materials possess titanium metal’s strength-to-weight ratio and corrosion resistance. In high-strength applications, titanium competes with aluminum, composites, intermetallics, steel, and superalloys. Aluminum, nickel, specialty steels, and zirconium alloys may be substituted for titanium for applications that require corrosion resistance. Ground calcium carbonate, precipitated calcium carbonate, kaolin, and talc compete with titanium dioxide as a white pigment.

^eEstimated. E Net exporter. W Withheld to avoid disclosing company proprietary data. — Zero.

¹See also Titanium Mineral Concentrates.

²Defined as imports – exports.

³Defined as production + imports – exports.

⁴U.S. Department of Labor, Bureau of Labor Statistics.

⁵Yearend operating capacity.

⁶Excludes U.S. production.